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| 10/667,170 | 09/19/2003 | Brett D. Niver | EMS-06401 | 8561 |

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| EXAMINER | |
|---|---|
| PATEL, HETUL B | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2186 | |

DATE MAILED: 10/06/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/667,170 | NIVER ET AL. | |
| | Examiner | Art Unit | |
| | Hetul Patel | 2186 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 03 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *29 September 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-42 and 44-46* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *21-23 and 44-46* is/are allowed.

6)☒ Claim(s) *1-14,17-20,24-37,40-42 and 44-46* is/are rejected.

7)☒ Claim(s) *15,16,38 and 39* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *29 September 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

1. Claims 1-42 and 44-46 are presented for examination. Claim 43 is missing.

2. The claims and only the claims form the metes and bounds of the invention. "Office personnel are to give claims their broadest reasonable interpretation in light of the supporting disclosure. In re Morris, 127 F.3d 1048, 1054-55, 44 USPQ2d 1023, 1027-28 (Fed. Cir. 1997). Limitations appearing in the specification but not recited in the claim are not read into the claim. In re Prater, 415 F.2d 1393, 1404-05, 162 USPQ 541, 550-551 (CCPA 1969)" (MPEP p 2100-8, c 2, l 45-48; p 2100-9, c 1, l 1-4). The Examiner has full latitude to interpret each claim in the broadest reasonable sense. The Examiner will reference prior art using terminology familiar to one of ordinary skill in the art. Such an approach is broad in concept and can be either explicit or implicit in meaning.

### *Specification*

3. The specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

### *Requirements for Information*

4. The examiner requests, in response to this Office action, any reference(s) known to qualify as prior art under 35 U.S.C. sections 102 or 10.3 with respect to the invention as defined by the independent and dependent claims. That is, any prior art (including any products for sale) similar to the claimed invention that could reasonably be used in a 102 or 103 rejection. This request does not require applicant to perform a search. This request is not intended to interfere with or go beyond that required under 37 C.F.R. 1.56 or 1.105.

The request may be fulfilled by asking the attorney(s) of record handling prosecution and the inventor(s)/assignee for references qualifying as prior art. A simple statement that the query has been made and no prior art found is sufficient to fulfill the request. Otherwise, the fee and certification requirements of 37 CFR section 1.97 are waived for those documents submitted in reply to this request. This waiver extends only to those documents within the scope of this request that are included in the application's first complete communication responding to this requirement. Any supplemental replies subsequent to the first communication responding to this request and any information disclosures beyond the scope of this are subject to the fee and certification requirements of 37 CFR section 1.97.

### *Claim Rejections - 35 USC § 112*

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claim 2 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 2 recites the limitation "said endpoints" in line 1. There is insufficient antecedent basis for this limitation in the claim.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1-3, 12, 24-26 and 35 are rejected under 35 U.S.C. 102(b) as being anticipated by Whiteside et al. (USPN: 4,330,826) hereinafter, Whiteside.

As per claim 1, Whiteside teaches a method for synchronizing a plurality of endpoints (i.e. computers A,B..N in Fig. 1) in a data storage system (i.e. shown in Fig. 1) at a first synchronization point, the method comprising: performing, by a first endpoint, a synchronization start operation wherein a first message (i.e. the signal) is sent from said first endpoint (i.e. the first computer) to one or more other endpoints (i.e. other computers) in the data storage system, said first message including a first key value (i.e. the first sampling number message) corresponding to said first synchronization point representing a current processing state of said first endpoint; determining, by said first endpoint, a timeout period (i.e. the predetermined time period);

determining, by said first endpoint using processing state information as reported to said first endpoint by other endpoints, whether synchronization with a selected portion of said one or more other endpoints at said first synchronization point has been accomplished within said timeout period (i.e. checking if the other computers contain same sampling number message as the first computer); and if said first endpoint determines that synchronization has not been accomplished within said timeout period, sending a second message to said one or more other endpoints indicating that said first endpoint is at another synchronization point different from said first synchronization point (i.e. if the other computers do not contain same sampling number message as the first computer, then the synchronizer is restarted again) (e.g. see the abstract and Fig. 1).

As per claim 2, Whiteside teaches the claimed invention as described above and furthermore, Whiteside teaches that said endpoints are directors in said data storage system, said synchronization start operation defines a start of a synchronization period for the first endpoint (i.e. the first sampling number message indicates the start of the synchronization), and said second message is sent as part of a synchronization stop operation marking an end of the synchronization period for the first endpoint (i.e. by restarting the synchronizer again) (e.g. see the abstract).

As per claim 3, Whiteside teaches the claimed invention as described above and furthermore, Whiteside teaches that said first and second messages are synchronization messages sent using a message switch (i.e. the sensors and manual

controls, 14 in Fig. 1) included in said data storage system (i.e. shown in Fig. 1) (e.g. see Fig. 1).

As per claim 12, Whiteside teaches the claimed invention as described above and furthermore, Whiteside teaches that the timeout period (i.e. the predetermined time period) is determined in accordance with an operation being performed for which the first synchronization point is specified (i.e. based on operations which must be synchronized) (e.g. see the abstract).

As per claims 24-26 and 35, see arguments with respect to the rejection of claims 1-3 and 12, respectively. Claims 24-26 and 35 are also rejected based on the same rationale as the rejection of claims 1-3 and 12, respectively.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 4-9, 13-14, 27-32 and 36-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Whiteside in view of Laudon (USPN: 5,680,576).

As per claim 4, Whiteside teaches the claimed invention as described above, but failed to teach about storing the processing state information in a key value storage area local to the first endpoint. Laudon, however, teaches a multiprocessor system having a plurality of processors, i.e. endpoints as claimed, each having a cache (e.g.

see the abstract). Laudon further teaches about storing, by said first endpoint (i.e. each processor), said processing state information (i.e. the current state) in a key value storage area (i.e. in the cache) local to said first endpoint (e.g. see Col. 1, lines 26-40). Accordingly, it would have been obvious to one of ordinary skills in the art at the time of the current invention was made to implement the teachings of Laudon in the method taught by Whiteside so coherent copies of cached information are maintained in a multiprocessing system for ease of use and high performance.

As per claim 5, the combination of Whiteside and Laudon teaches the claimed invention as described above and furthermore, Laudon teaches that the method further comprising broadcasting, by each endpoint in the data storage system, a synchronization message including a key value corresponding to a current processing state of said each endpoint to every other endpoint in the data storage system; and recording, by each endpoint in the data storage system, key values for each endpoint for all received synchronization messages, each endpoint storing said key values in a key value storage area local to each endpoint (i.e. each cache broadcasting its current state to all other caches and all other caches records/stores the received states) (e.g. see Col. 1, lines 26-40).

As per claim 6, the combination of Whiteside and Laudon teaches the claimed invention as described above and furthermore, Whiteside teaches that the step of determining whether synchronization with a selected portion of said one or more other endpoints at said first synchronization point has been accomplished within said timeout period (i.e. checking if the other computers contain same sampling number message as

the first computer); and if said first endpoint determines that synchronization has not been accomplished within said timeout period, sending a second message to said one or more other endpoints indicating that said first endpoint is at another synchronization point different from said first synchronization point (i.e. if the other computers do not contain same sampling number message as the first computer, then the synchronizer is restarted again) is performed as part of a synchronization check operation (e.g. see the abstract and Fig. 1).

As per claim 7, the combination of Whiteside and Laudon teaches the claimed invention as described above and furthermore, Whiteside teaches that said second message is a synchronization message including a key value (i.e. a message indicating that the other computers do not contain same sampling number message as the first computer) corresponding to said other synchronization point (e.g. see the abstract).

As per claim 8, the combination of Whiteside and Laudon teaches the claimed invention as described above and furthermore, Whiteside teaches that said key value indicates one of: an invalid synchronization processing state, and another valid processing state of said first endpoint (i.e. the message either indicates that the other computers do not contain same sampling number message as the first computer or vice versa) (e.g. see the abstract).

As per claim 9, Whiteside teaches the claimed invention as described above but failed to teach the further limitation of the first endpoint determining whether synchronization has occurred for a subset of the selection portion of endpoints in accordance with the processing state information of the first endpoint. Laudon, on the

other hand, teaches that the cache of the first processor determines whether synchronization has occurred between the current cache and all other caches by sending and receiving the current state (e.g. see Col. 1, lines 26-40). Accordingly, it would have been obvious to one of ordinary skills in the art at the time of the current invention was made to implement the teachings of Laudon in the method taught by Whiteside so coherent copies of cached information are maintained in a multiprocessing system for ease of use and high performance.

As per claims 13 and 14, Whiteside teaches the claimed invention as described above, but failed to teach the further limitation of maintaining a local copy of the state information in each endpoint of the data storage system and is not synchronized with state info of other endpoints in the data storage system. Laudon, however, teaches a multiprocessor system having a plurality of processors, i.e. endpoints as claimed, each having a cache (e.g. see the abstract). Laudon further teaches about storing, by each endpoint (i.e. each processor), the processing state information (i.e. the current state) in a key value storage area (i.e. in the cache) local to each endpoint (e.g. see Col. 1, lines 26-40). Accordingly, it would have been obvious to one of ordinary skills in the art at the time of the current invention was made to implement the teachings of Laudon in the method taught by Whiteside so coherent copies of cached information are maintained in a multiprocessing system for ease of use and high performance. Laudon further teaches that until the synchronization operation is executed, a local copy of the state information in each endpoint is not synchronized with state info of other endpoints in the data storage system (e.g. see Col. 1, lines 26-40).

As per claims 27-32 and 36-37, see arguments with respect to the rejection of claims 4-9 and 13-14, respectively. Claims 27-32 and 36-37 are also rejected based on the same rationale as the rejection of claims 4-9 and 13-14, respectively.

8. Claims 10-11 and 33-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Whiteside in view of Oberlin et al. (USPN: 5,434,995) hereinafter, Oberlin.

As per claims 10 and 11, Whiteside teaches the claimed invention as described above. However, Whiteside failed to teach that the selected portion of said one or more other endpoints is stored by the first endpoint as a synchronization mask. Oberlin, on the other hand, teaches about the synchronization mask (i.e. BSMI shown in Fig. 7) which contains a number of bits equal to the number of processing elements to enable or disable the synchronization circuit (e.g. see Col. 9, lines 45+ and Fig. 7). Accordingly, it would have been obvious to one of ordinary skills in the art at the time of the current invention was made to implement the teachings of Oberlin in the method taught by Whiteside so it can be determined that one or more endpoints are synchronized with the first endpoint just by examining the synchronization mask. Therefore, it is being advantageous.

As per claims 33-34, see arguments with respect to the rejection of claims 10-11, respectively. Claims 33-34 are also rejected based on the same rationale as the rejection of claims 10-11, respectively.

9. Claims 17-20 and 40-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Whiteside in view of Elkington et al. (USPN: 6,571,324) hereinafter, Elkington.

As per claims 17-20, Whiteside teaches the claimed invention as described above. However, Whiteside does not disclose that the first synchronization point represents an even corresponding to one of: enabling and disabling a mirrored write operation wherein when enabled, a write to a portion of a global memory is performed to two memory boards, and when disabled, a write to a portion of a global memory is performed to one memory board. Elkington teaches about the first synchronization point (i.e. the warmswap process) in which the mirror write operation is disabled by not writing to the failed cache and writing to only the good cache; and each cache is on different memory board (e.g. see the abstract and Fig. 1). Accordingly, it would have been obvious to one of ordinary skills in the art at the time of the current invention was made to implement the warmswap process of Elkington in the method taught by Whiteside so the bad memory module can be replaced with the new memory module without affecting the data integrity and security. Elkington further teaches that the first synchronization point (i.e. the warmswap process) represents an event corresponding to one of: enabling and disabling operations to hardware element, i.e. disabling operations of the hardware element, the bad cache, by bringing off-line; and enabling operations of the hardware element, the new replacement cache, by bringing on-line, as claimed in claims 18-20 (e.g. see the abstract).

As per claims 40-42, see arguments with respect to the rejection of claims 17-20. Claims 40-42 are also rejected based on the same rationale as the rejection of claims 17-20.

***Allowable Subject Matter***

10. Claims 15-16 and 38-39 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

11. Claims 21-23 and 44-46 are allowed.

***Conclusion***

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hetul Patel whose telephone number is 571-272-4184. The examiner can normally be reached on M-F 8-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matt Kim can be reached on 571-272-4182. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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